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IDEAL SURGERY.

Read before the St. Louis Medical Society.

BY

G. WILEY BROOME, M.D.,

PROFESSOR PRINCIPLES OF SURGERY AND CLINICAL SURGERY, WOMAN'S
MEDICAL COLLEGE; SURGEON TO THE WOMAN'S HOSPITAL;
CONSULTING SURGEON TO THE ST. LOUIS CITY
AND FEMALE HOSPITALS, ETC.



Reprinted from the "Journal of the American Medical Association,"
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IDEAL SURGERY.

BY G. WILEY BROOME, M.D.,

OF ST. LOUIS, MO.

Mr. President:—It is plainly apparent to the student of medicine that the practice of modern surgery is wholly unlike the practice which prevailed, and was approved, only a few years ago.

In the light of advanced surgical pathology, bacteriology, and the now more familiar processes of regeneration and repair, modern surgical methods bear but slight resemblance to those that were practiced a very short time ago.

It is furthermore clearly apparent that the whole tendency of modern surgery is to secure ideal results, and at the same time to keep the practice well abreast with the revolution necessitated by the indications discovered through intelligent clinical observation, scientific investigation and experimental research,

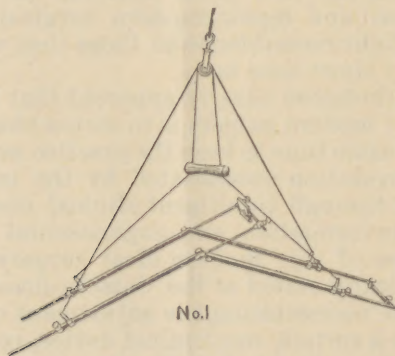
The scope of this modern ideal surgery—it may be emphatically stated at the outset—does not embrace a rule necessitating the adjustment of a class of cases to a certain mechanical device, in order to secure ideal results; but it does require to act intelligently and institute such methods of treatment as will best serve the purpose in each particular case.

Modern scientific surgery can only contemplate such rules in the light of impediments to its progress, as true science is not and never was dogmatical. The

orthodox apparatus must be eliminated from the instrumentarium of the surgeon whose aim is to achieve the ideal of liberal scientific surgery.

I recently heard a distinguished surgeon state in one of his lectures, "that one great hindrance to progress is the inexorable *penchant* of the masses of the profession to adapt cases to old established plans of treatment. One mounts a hobby and soon others follow. Nothing, he thought, could have a more pernicious effect upon universal scientific surgical advancement."

In consequence of the disparity of opinions expressed here a few evenings ago in the discussion of a report presented by Dr. Outten to this Society, I believe that a brief inquiry respecting the present status of progressive surgery will not be considered untimely or inappropriate. With reference to the treatment of compound fractures of the thigh



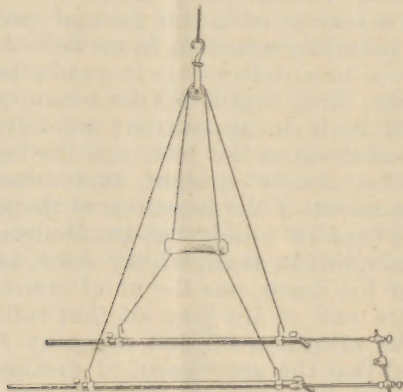
bone, I wish to reiterate what I then said respecting the use of the Hodgen splint, and which was forcibly illustrated in the case shown here by Dr. Outten. The man's injured extremity got well, it is true, after nearly two years of close confine-

ment; but in consequence of the position in which the limb was kept, the knee-joint became perfectly stiff and unyielding, with also great angular deformity at the site of fracture.

I wish to state here that very soon after I graduated in medicine, I was employed as the chief surgeon of the Wabash Railroad Company, and held that position during eight years. It was after practicing a year or so in this field of surgery, that it became painfully apparent to me that the Hodgen splint proved to be defective in two essential particulars, namely: first, that it did not retain the ends of the broken bone in apposition; secondly, that by applying extension at the foot, and the leg retained in a position nearly straight, there was entailed great impairment of the functions of the knee-joint.

You will bear in mind that Dr. Hodgen himself applied his splint to many of my cases, as he, until the time of his death, was the chief consulting surgeon at this end of the line of that railroad company. The attorneys of that company frequently complained that the assessment of damages against the company for personal injuries was quite as large in consequence of the impaired knee-joint (a condition wholly the effect of the splint), as it was for the injury itself. Actuated by a sense of duty toward my employers, and for the welfare of these patients, about this time I devised and made this splint which I now show you. As may be seen, my modification of the suspension apparatus is constructed upon the plan of a double incline plane. The limb is dressed in a more physiological position—that is, semi-flexed, with the extending force fixed in front of the knee instead of the foot. By this splint the knee-joint is completely protected from overstrain and its baneful consequences. You will also observe that the splint is so constructed as to enable the surgeon to readily adjust it to any sized limb,

including the arm. In adapting the apparatus to the suspension of the arm the distal rods must be disconnected at the middle joints, the thigh braces proper may then be used at once as a complete suspensory apparatus for a shattered arm. (This is the part of the splint used for that purpose.)



I exhibited the same to Dr. Hodgen, and he expressed to me his approval of my modification. I continued to use this splint during the years I remained with the company, and no more complaints or excessive demands for compensation were ever made from persons with disabled knee-joints after the treatment of broken thigh bones. (This device, together with an illustration of the splint, were published by Dr. Borck, of this city, in 1879—fourteen years ago.)

Now while this apparatus protects the knee, and in that respect it is a great improvement on the Hodgen splint, nevertheless it is still defective, and does not fully come up to the requirements of ideal surgery. But it was one step in that direction.

Modern surgery received its first impulse at the time when Virchow published his scientific discovery of cellular pathology, in the year 1858.

The demonstration that cells are derived from pre-existing cells came as a revelation to most physicians throughout the world.

The principles of cellular pathology have become to such an extent an integral part of medical thought, that we can hardly estimate, to-day, all that this discovery meant a generation ago.

To do this we must put ourselves back, in thought, to a time when all organized pathological products, pus, tubercle, cancer and all tumors, were supposed to be formed out of a primitive blastema—an exudation of some kind.

Under the influence of such ideas, any coherent or intelligent opinion as to the nature and development of morbid processes would be quite impossible. The never-ending strife between humoralism and solidism would probably be going on to-day had it not received its deathblow from cellular pathology.

The ontological conception of disease processes passed out of the horizon of scientific medicine when this discovery was made.

With the recognition of this great discovery, it became clearer than ever before, that the laws in disease are not different from those in operation in health, but are simply subject to different conditions.

The second splendid era of scientific value to the modern surgeon was inaugurated through the labors of the distinguished botanist Schleiden, whose brilliant conclusions, as they were drawn from the study of vegetable histology, were at once extended by Theodor Schwann to the animal kingdom; and then soon followed the demonstration of the migration of the leucocytes from the vessels and of the specific cellular germs of disease; now the inestimable dis-

covery of W. Fleming designated by the term karyokinesis, or the indirect mode of cell reproduction, was published to the scientific world.

Out of those researches the function of the cell, in the process of regeneration and repair, became better understood; and it was soon demonstrated that the function of cell life includes, in a condition of perfect health in the matured body, the normal waste incident to the increasing activity of the tissues; and is balanced by the reparative process, while during the development of the body, an excess of material is added.

From a surgical aspect, cell reproduction or regeneration observed in the healing of wounds produced by severe injuries, and the complete or partial restoration of parts damaged or destroyed by this, and various destructive inflammatory processes caused by the presence of specific pathogenic microorganisms, is a study essential to secure ideal results in the practice of surgery.

There is no doubt existing now in the proposition, that an injury, defect, or the loss of considerable substance, will be repaired from proliferation of preëxisting cells, which compose the structure sustaining the injury, defect or loss of substance. The fixed tissue-cells at the site of injury being endowed from earliest embryonal life with intrinsic power of adaptation to existing conditions surrounding them, assume active tissue proliferation; and the embryonal cells thus produced constitute the granulation tissue, which toward the completion of the healing process, is transformed into mature cells, representing the injured parent tissues which have undergone the reparative process.

The third era, constituting the simple conception, the basis of early antiseptic procedure in surgery, that a wound to which bacteria gain access becomes infected in the same way that a sterilized

infusion of meat undergoes putrefaction when a single suitable germ enters, has, it is true, been greatly modified; but the establishment of this truth even before its complete demonstration and the introduction of wound treatment based upon it, must remain forever the merit of the immortal Lister. It is the knowledge of the "how" to obtain aseptic healing of wounds, that has revolutionized surgical practice and made *modern ideal surgery possible*.

Soon the fourth era of this brilliant evolution in the progressive stages of scientific surgery began to take form. It was not long after cell life was cleverly understood until Metschnikoff and others, by certain methods of scientific investigation, demonstrated the fact, that the living tissues were not passive breeding places for bacteria, but that they were able to offer a very considerable resistance to the growth of microorganisms. This discovery was a great boon to the surgeon, for by it he was emancipated from the superstitious dread attending a particular surgical procedure where, from unsurmountable circumstances, the *débridement* is unavoidably imperfect and a limited number of bacteria gain access to the wound.

It is owing probably to this fact of phagocytosis that many cases of imperfect asepsis in surgical operations often heal well. It has been demonstrated by Cheyne and others that doses of less than 18,000,000 of the proteus vulgaris when injected into the muscular tissue of a rabbit seldom cause any result, and it requires as large a number as 250,000,000 to produce a circumscribed abscess.

But of course the condition of the serum, together with the macrophagi and microphagi at the point at which the organisms are arrested, is also a matter of great importance. Tissues which have been damaged by injury, bad surgery, or defective surgical appliances, are not so resistant to the action of bac-

teria as when in a state of health. A healthy peritoneum may receive and absorb a large number of bacteria; but if damaged during a laparotomy, so that a considerable portion of its absorbing surface has been impaired, and at the same time considerable oozing of blood and serum has taken place from the injured surfaces, a soil favorable for the growth of the organisms is produced and a septic peritonitis may result, even though the operative procedure in other respects may have been conducted under an ordinarily intelligent aseptic detail. Tense sutures also are more likely to be followed by stitch abscesses than where the suture margins are so coapted as not to destroy the chemotactic properties of the leucocytes and other elements concerned in phagocytosis.

In the light of these discoveries we have learned that suppuration means a destructive process, the significance, and remote effects of which, can only be fully appreciated, by the surgeon, whose best efforts are exercised in behalf of humanity, and the *ideal* of scientific work; suppuration itself means microbial action upon healthy tissue elements, in which *leucocytes and embryonal cells are converted into pus corpuscles*. And it has for some time been known, that long continued suppuration of a wound produces amyloid degeneration of organs remote from the seat of suppuration; that is, by the accumulation of the ptomaines of pus microbes, coagulation necrosis may be produced in other organs of the body, and amyloid degeneration as a consequence.

Hence, after prolonged suppuration the patient can never hope to regain his former functional vigor, therefore the importance of preventing or arresting all suppurative action..

Senn long ago made the assertion that pus microbes are the immediate and essential cause of sup-

puration, inflammation and pus formation; and no one has as yet been able to successfully contradict that assertion. So that the etiological explanation, of wound infection, and suppuration, is based wholly, upon the presence, and action of the pyogenic bacteria and their ptomaines.

The chief aim, and object, of ideal surgery, is to prevent suppuration, and secure the healing of a wound, by the first intention, and without suppuration. In a wound where there has been so much loss of substance, as to prevent a proper approximation of the parts, it must of necessity heal by granulation. In the ideal treatment of wounds, the classification into "open" and "subcutaneous" wounds, there is no longer the same practical importance, as an open wound is at once placed under the same favorable conditions for satisfactory and rapid healing, as a subcutaneous wound. It was stated here by several gentlemen who took part in the discussion of Dr. Outten's paper, that an open wound must be exposed to frequent inspection, and that it must also have drainage tubes passed through it.

The fundamental principle underlying ideal wound treatment, as I have stated, consists in preventing suppuration. To prevent suppuration in an open wound, the wound and its environment must be kept aseptic. I do not believe that any progressive surgeon will attempt to deny the force and truth of this assertion.

The indications to be met in a compound fracture of the thigh, for example, are first, the disinfection of the entire wound and its environment; second, the approximation of all the structures implicated as near as possible to their normal anatomical relations, *i.e.*, bone to bone, periosteum to periosteum, muscle tendon and nerves to muscle tendon and nerves, skin to skin, and direct fixation, over which is applied a thick hygroscopic dressing, then immobilization. If

these indications have been completely fulfilled, the dressing should not be disturbed for from four to five weeks. *This is ideal surgery.*

When the profession can realize that fractures must be treated in the same manner, as the soft parts, in order to secure union by the first intention, then and not till then, will humanity have ceased to suffer from the surgery of dogmatism. The traditional methods, which depend upon provisional callus, in the union of a broken bone, have no place in modern methods.

The orthodox apparatus which demands the adjustment of all cases to any antiquated system, and necessarily to defective notions, has been eliminated from the instrumentarium of ideal surgery.

There is no longer any room for argument against the danger involved and the unsurgical system of treating wounds by the open method. That era belongs to the past and to history, a practice which modern surgery looks back upon with horror; a wound treated in a manner that constantly exposes it to infection and consequent suppuration and amyloid degeneration of other organs, receives no consideration from ideal surgery. As to the use of the drainage tube, I cannot express my own views more forcibly, than in the words of the celebrated surgeon and author, Thomas Bryant, of London, who said, "I always regret to see a rubber drainage tube passed through a wound; it may be through a joint, or through a *thigh*, or stump; such a drainage tube is a seton, and is not necessary." If a drainage tube through a wound in the thigh acts like a *seton*—as this distinguished surgeon says it does—then the surgeon who places it there may be held responsible for the baneful sequence of long continued suppuration.

Roswell Park, of Buffalo, who is not only a great surgeon but also a pathologist of world-wide fame, stated before the congress of American Surgeons two

years ago, "That drainage is mainly practiced from habit or from fear. The promiscuous practice of drainage is a confession of fear or weakness; both of which are unscientific and unfortunate." I might multiply evidence in this direction, but to an intelligent body of scientific men it would seem superfluous. As suggested, when discussing Dr. Outten's case, the favorable progress and termination of such a wound, depends almost wholly upon how perfectly the wound has been purified and the first dressing applied. By "purifying" is meant securing a most thoroughly aseptic condition, by cleansing the entire interior of the wound in every nook and recess of possible infection; and in order that the wound may be rendered perfectly free from microbial contamination, it may be necessary, at varied intervals, to allow the patient a few whiffs of an anæsthetic, that the work may be properly performed without great pain. After securing this moderate degree of anæsthesia, the surface of the limb from the abdomen to the toes is thoroughly shaved and washed with hot water and brush. If grease or other filth of this nature from machinery is found in the wound, rubbing with sweet oil or with turpentine and alcohol before scrubbing with soap and water, greatly facilitates complete asepticism. Wounded vessels must be tied, all parenchymatous oozing stopped, blood clots and foreign particles removed, divided muscles, tendons and nerves sutured, the ends of the fragments trimmed, if necessary, and destroyed tissues cut away. This work completed, the wound is now thoroughly irrigated with hot solutions of first sublimate and then chloride of zinc. The latter penetrates the tissues and acts as a stimulant to the disabled structures; besides it possesses well known germicidal properties. The ends of the broken bone may now be approximated and fixed by wire sutures or ivory nails or some such device. In the event that there

has been loss of bone substance, Bercher suggests the implantation of a solid bone cylinder adequate to compensate for the loss.

Senn, the pioneer of bone surgery, appreciating more completely than perhaps many others the scientific value of cultivating the implantation of even a foreign substance in bone in order to fill up a space made vacant by any loss of substance, wires a hollow bone cylinder between the ends of the shattered bone, thus imitating nature as perfectly as possible; and the healing process proceeds upon the same principle, so beautifully illustrated in the healing of wounds, beneath a moist blood clot, first brought into practical utility by the renowned Schede. Even though a muscle, a nerve, or a tendon, may have sustained a considerable loss of substance, by the violence producing a compound fracture, and the ends cannot be properly approximated, they must be sutured, just the same. Large cat-gut sutures, must be used for the purpose, and several sutures introduced; these suture strands, will serve as a "false work" over the breach, upon which the embryonal cells, may construct a more substantial bridge, gaining thereby almost perfect *restitutio in integrum* and the attainment of a perfect functional result will be secured in a short time; otherwise the muscle, nerve or tendon having sustained the loss of substance, will retract, and their ends heal by granulation and cicatrization with almost total loss of functional activity, as in Dr. Outten's case. An efficient external support is applied to the thigh and this together with the dressings are allowed to remain for several weeks. If death of any portion of the injured tissues takes place, it will be *aseptic death*, and no harm can follow. Thus, *ideal results are achieved, and the ideal of scientific progress consummated*, and the further advance toward that which we should all desire the most, namely, the *prevention of deformities, the relief*

of suffering humanity, and the prolongation of human life and usefulness.

The special points in the foregoing remarks that I wish to emphasize, may be epitomized in the following brief conclusions:

1. That by the development of cellular pathology the process of cell proliferation, and the discovery of the laws of repair and regeneration, and the introduction of Lister's antiseptic system, the principles underlying the practice of surgery have undergone a complete revolution within the last few years.

2. That the principles of scientific surgery are so intimately interwoven with the advances in bacteriological pathology, that a progressive knowledge of the latter is essential, in order to be able to intelligently appreciate its value, in practical surgery, or to comprehend the principles upon which ideal surgery is founded.

3. That the observation made by Cabot, "That every surgical operation is an experiment in bacteriology," proves to be full of wisdom.

4. That the merely antiseptic era has been passed by modern surgery and the trend of the surgery of the future is to purely aseptic procedures; antiseptis is gradually being supplanted by asepsis and disinfection is made unnecessary by avoiding infection.

5. That to secure ideal results in the treatment of compound fractures the injury of the bone must be treated upon the same general principles that are applied to secure union by the first intention of wounds in soft parts; that is, by carrying out in detail the rules of asepsis and antiseptis, immediate and perfect reduction, approximation with direct fixation, efficient external support, and immobilization.

